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ABSTRACT

Project COULD (Career Orientation Utilizing Language Development) was developed as a means of building skills, knowledges, and attitudes on elementary children's previously acquired backgrounds. Children learn to speak the grammar and vocabulary characteristic of the language heard most frequently at home and in the immediate environment. Each unit of this instructional guide is designed to promote vocational awareness, exploration, and language development. The information in this unit on wood processing was prepared for use at the fifth grade level for an approximate period of four weeks. It is divided into eight sections: a summary, an outline of the entire set of units for the category of lumbering, Project COULD's goals, a list of the performance objectives, a vocabulary list, suggested learning activities, numerous resource materials (films, filmstrips, transparency sets, instruction sheets, pamphlets, books, records, slides, resource people, and a resource outline questionnaire), and background information on the lumber industry (job and process flow charts, job summaries, and suggested teacher reading). (Author/BP)

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CAREER ORIENTATION UTILIZING LANGUAGE DEVELOPMENT

PROJECT COULD

AN ESEA, TITLE III PROJECT SERVING COOS COUNTY, OREGON

COOS IED · 2405 COLORADO ST. · NORTH BEND, OREGON · 97459 · TELEPHONE 503+756-3138

DONALD E. DAY · PROJECT COORDINATOR

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L #3
WOOD PROCESSING
GRADE 5

SUPERINTENDENT PUBLIC INSTRUCTION: DR. DALE PARNELL

COORDINATOR OF ESEA, TITLE III: ROBERT GREEN

SUPERINTENDENT COOS COUNTY IED: DR. THOMAS J. WALKER

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PROJECT COULD

CAREER ORIENTATION UTILIZING LANGUAGE DEVELOPMENT

A PACE PROJECT

Elementary and Secondary Education Act of 1965

Project COULD was developed as a means of building skills, knowledges, and attitudes upon elementary children's previously acquired backgrounds. Children learn to speak the grammar and vocabulary characteristic of the language heard most frequently at home and in the immediate environment.

A series of units of instruction were developed from the concepts and vocabulary of the industries indigenous to Coos County. The intention was to promote vocational awareness, exploration and language development for the students in grades 3 through 8.

Materials prepared by Project COULD are available from the IMC of Coos County Intermediate Education District, 2405 Colorado Street, North Bend, Oregon, 97459.

SCHEDULE OF UNITS

Grade Level	Lumbering
Grade 3 Unit L #1	Logging
Grade 4 Unit L #2	Logging Transportation
Grade 5 Unit L #3	Wood Processing
Grade 6 Unit L #4	Marketing Wood Products
Grade 7 Unit L #5	Lumbering Ecology
Grade 8 Unit L #6	Coos County Careers in Lumbering

SUMMARY

This instructional guide is divided into eight sections. Each section is tabulated for easier use and quick reference.

Summary:

The intentions and reasoning for this program have been stated. For effective results, it is suggested that the teacher becomes totally familiar with the curriculum guide before beginning.

Outline:

This section gives an overall view of all of the sequenced units. Details of the information to be covered in this unit are specifically outlined.

Goals:
Objectives:
Activities:

These three sections are sequentially integrated to clearly define what activities are suggested for a particular objective and a particular goal. Each goal is numbered to correlate directly with objectives, activities and resources.

Vocabulary:

All terminology found in the unit, including particular occupations, is included in this section. Each term is defined. These definitions are intended for teacher use only.

Resources:

Locally produced material, Coos County resource people, books, pamphlets and commercially prepared media are listed with reference made to activity correlation.

Background:

This section contains additional material for teacher use.

WOOD PROCESSING

UNIT L #3 OVERVIEW

The following outline represents the scope of the entire set of units (grades 3-8) for the category of LUMBERING. Only the outline for this unit is in its completed form.

SUGGESTED TIME: FOUR WEEKS

Millworker Jobs: 1 day
Vocabulary: Integrated throughout the unit
Three Mill Processes: 11 days
Environmental Factors: 1 day
Economic Influences: 1 day

(UNIT L #1) LOGGING
- A. The many jobs of the logger
- B. Logging terminology relating to the logger
- C. Two main types of logging shows
- D. Environmental factors affecting logging
- E. Influence of logging on the economy

(UNIT L #2) LOGGING TRANSPORTATION
- A. Jobs in log transportation
- B. Terminology relating to jobs in logging transportation
- C. Two main methods of log transportation
- D. Environmental factors affecting transportation
- E. Influence of log transportation on the economy

(UNIT L #3) WOOD PROCESSING
- A. The many jobs of the millworker
  1. Pondmen
  2. Scalers
  3. Mechanics
  4. Millwrights
  5. Clean-Up Crews
  6. Secretaries
  7. Engineers
  8. Barker Operator
  9. Graders
  10. Sawyers
  11. Separators
  12. Gluers
  13. Quality Controllers
  14. Machine Tenders
  15. Pullers
  16. Strapper Operators
  17. Loaders
  18. Feeders
  19. Clippers
  20. Patchers

OUTLINE

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B. Terminology relating to the jobs of the millworker (See VOCABULARY)
C. Three main types of milling processes
   1. Saw and Planing Mill
   2. Plywood Mill
   3. Paper Mill
D. Environmental factors
   1. Affecting the Industry
   2. Affected by the Industry
E. Influences of the lumber processing industry on the economy

(UNIT L #4) MARKETING WOOD PRODUCTS
A. Jobs in marketing
B. Marketing terminology
C. Wholesale and retail markets
D. Environmental factors
E. Economic relationships

(UNIT L #5) LUMBERING ECOLOGY
A. Workers involved in environmental quality control
B. Technical terminology relating to environmental quality control
C. The different methods used to control the quality of the environment in Coos County
D. The way in which the quality of the environment affects the economy of the County

(UNIT L #6) COOS COUNTY CAREERS IN LUMBERING
A. Opportunities for employment
B. Occupational interest inventory
C. Steps in applying for a job
D. The job interview
E. Employment vocabulary

GOALS

1. To make the students aware that lumber processing offers various opportunities for employment on a seasonal and full time basis.

2. To make the students aware that the lumber processing industry has a unique set of terms that are used to facilitate communications among the people working in that industry.

3. To make the students aware of the three main lumber milling processes used in Coos County.

4. To make the students aware of the environmental factors that influence and are influenced by the lumber processing industries in Coos County.

5. To make the students aware that the wages spent by the workers in the lumber processing industry play an integral part in the total economy of Coos County.

The intention of Project COULD units is to utilize the language arts areas of reading, writing, listening and speaking, as the vehicles to promote vocational awareness and exploration. It is <u>not</u> to dictate language arts curriculum, but to suggest that the vocational areas under consideration do have unique languages and concepts.

It is assumed that the language development aspect of the activities will be commensurate with the on-going language arts programs of the students participating in the various units prepared by COULD.

PERFORMANCE OBJECTIVES

1. Given a list of workers in the saw, paper and plywood mills, and a list of their job descriptions, each learner will match the two lists with 80% accuracy in ten minutes.

2. Given the vocabulary words listed in this unit and a time limit of twenty minutes, each learner will select and write definitions for at least ten words without the aid of references. The teacher will determine the accuracy of the definitions given by each learner.

3. Given the random list of job titles and vocabulary words and a time limit of ten minutes, each learner will group the job titles and vocabulary words with 80% accuracy under the appropriate heading or headings: SAWMILL, PLYWOOD MILL and PAPER MILL

block saw	lathe operator	couch roll
bull chain	patchers	pulp
conveyor belt	veneer	white water
gang saw	pullers	liquor plant operator
head rig	hot press	
slip	core feeder	
secretary		

4. Given a choice of the environmental and ecological problems facing the lumber processing industry in Coos County listed in Activity 4-D, each learner will:

   a. Select one problem
   b. Invent a solution
   c. Represent the solution in a visual diagram
   d. Explain the diagram in two-to-four minute presentation to the class

   The overall time limit will be set by the teacher.

5. Given the worksheet entitled, THE WORKER AND HIS WAGES, listing the highest and lowest paid workers in the mill, each learner will, with 80% accuracy, calculate the following average pay wages and answer the remaining thought questions within a time limit set by the teacher:

   a. Average hourly pay for a mill worker
   b. Wages for an 8 hour work day
   c. Wages for a 40 hour work week
   d. Wages for a 4 week month
   e. Wages for a 52 week year
   f. Average total wages paid to all mill workers in Coos County

THE DEFINITIONS PROVIDED ARE INTENDED FOR TEACHER USE. IT IS SUGGESTED THAT THE STUDENTS FORMULATE THEIR OWN DEFINITIONS THROUGH THE ACTIVITIES OF THIS UNIT.

VOCABULARY AND SPELLING

In this unit 60 vocabulary words and 20 key occupations are discussed. These words and occupations can and should be used as a part of the spelling program in the classroom. You as the teacher, are the best judge as to how this should be done in your classroom. No matter how you approach the matter, remember that it is just as important to know how to spell the word as it is to know how to use it correctly in speaking.

MASTER VOCABULARY LIST

A permanent listing of all current vocabulary words should be available to the students at all times during the study of Processing. Having this list of words and their definitions readily available to the children on charts, the overhead projector, the blackboard or a vocabulary notebook will provide the children with an immediate reference should the need arise. A professional in-depth type of definition will not be nearly as valuable to the children as one that they have written, discussed and put on the master list themselves. If a definition is to be useful, it must be easily understood by the children.

SAW AND PLANING MILL VOCABULARY

BARKER	A mechanical or hydraulic machine used to remove bark from logs.
BLOCK SAW	A large circular saw used for cutting logs to specified lengths.
BULL CHAIN	The chain which takes the log from the log pond to the level of the mill.
CANT	After the head rig* sawyer has cut the rounded portions from the log, the remaining piece of wood is called a cant. Cants may have 2 or 4 flat sides.
CONVEYOR BELT	A flat rubber-like endless belt which can carry materials from one place to another in the mill.
CORK BOOTS	Also called corks or calked boots. Worn by some millworkers because the small nails sticking out of the soles provide good traction when they are working on or around timber.
EDGER	A saw that trims the width of a piece of lumber.
FRINGE BENEFIT	Such as health insurance, life insurance, vacation and holiday pay, jury duty pay, paid by the employer.
GANG SAW	A battery of vertical reciprocating or circular saws used to cut large cants* into planks* two inches in width and the length of the cant.
GREEN CHAIN	A long chain which moves the lumber past the pullers*. Called green chain because the lumber along this chain has not yet been kiln* dried.
HARD HAT	A hat worn by millworkers to protect them from a head injury.
HEAD RIG	A large band saw which is driven by two large wheels one above the floor and one below. The carriage holding the log is moved back and forth across the saw blade with each successive cut that is made from the log.
KILN	A building in which warm, dry air is forced through stacks of lumber to dry and thus cure the lumber.
PIKE POLE	Long aluminum pole with a spike point and fixed hook at one end. Used to shove logs into the slip.

*Defined in the vocabulary section

PLANER	The machine which sizes the wood to a preset dimension. Can be set to plane two or four sides depending upon the type of finish ordered by consumer.
PLANER CHAIN	The pulling chain in the planer mill.
PLANK	The boards yielded by the successive cuts of the head rig* saw after the slab* has been cut. These planks are under 6 inches in thickness.
SEPARATOR	A machine which can divert the flow of the product to various processes.
SLAB	The first cut made by the head rig* operator yields a piece of wood known as a slab. The slab has only one flat side.
SLASHER	A slasher saws up waste materials to be used as chips or fuel in the boilers. It is a type of saw.
SLIP	The waterway leading to the log lift or bull chain*.
TIMBER	A large piece of lumber measuring normally 6 inches or thicker used for beams and pillars in construction.
TRIMMER	A battery of circular saws two feet apart which can be lowered to cut a board to a specific length.

*Defined in the vocabulary section

PLYWOOD MILL VOCABULARY

BACK	The sheet of veneer* that is used for the back of the plywood* board. Measures about 48" x 96".
BARKER	See Sawmill vocabulary.
BLOCK	Debarked log, eight feet in length.
BULL CHAIN	See Sawmill vocabulary.
CENTER	A piece of veneer 24" x 96" used as the center portion of the plywood* board.
CHUCK	The part of the lathe* which is pushed into the end of the block*. Chuck turns and in so doing, turns the log so that it can be peeled to yield veneer*.
CONVEYOR BELT	A continuous belt of rubber material used to transport veneer*.
CORE VENEER	Veneer* that is used for the core layers in plywood*. Usually these pieces are 24" or less in width.
EDGE GLUER	Glues together 24" strips of veneer* to form 48" widths of veneer.
FACE	The sheet of veneer* that is used for the front of the plywood* board. Measures about 48" x 96".
FEED CHAIN	A chain with special teeth to move logs in the mill.
FRINGE BENEFIT	See Saw and Planing Mill vocabulary.
HEARTWOOD	The center portion of the tree. Is usually more knot free providing a better grade veneer*.
HOT PRESS	The machine automatically loads the plywood, presses it under 170 pounds of pressure and heats it to between 230° and 300°F. Then, automatically empties itself, stacking the plywood* in a pile. In less automated mills, the plywood is loaded into the hot press by men.
LATHE	Machine used to peel veneer* from logs. Made up of two chucks* that hold the log in place while it is being turned against the lathe knife.
LATHE CHARGER	The machine that picks up the log from the feed chain* and centers the block on the lathe*.

*Defined in the vocabulary section

LAYUP MACHINE	The machine that automatically places a face* sheet of veneer*, one center* and the back* sheet of veneer together and glues them together. Also applies glue to the core* fed in by the feeder* and crowder (see feeder).
PLYWOOD	Alternating layers of veneer* with the grains running at 90° angles to one another. First comes the back* sheet with the grain running the length of the sheet. Then comes the smaller core* pieces layed so the grain runs the width of the board. Next is the two center* sheets whose grain again runs the length of the board. Then comes more core pieces, again layed so the grain is at right angles to the layer above and below it. Last is the face* veneer with the grain running against the length of the board.
RAIMANN PATCHER	The patcher that punches out the knot in the veneer* and replaces it with the familiar football shaped patch seen in plywood*.
SAPWOOD	The outer portions of the log closest to the bark. The growing living portion of the tree. Contains most of the knots.
SLIP	The waterway leading to the log lift or bull chain*.
SPLICER	Glues together 24" strips of veneer* to make the larger 48" pieces that will form the face or back of the sheet of plywood*.
TRAYS	Conveyor belts* in several layers. Used to move and store the veneer*.
VENEER	Thin layers of wood from which plywood* is made.

*Defined in the vocabulary section

PAPER MILL VOCABULARY

BARKER	See Sawmill vocabulary.
BREAST ROLL	The roll onto which the pulp* falls before being transferred directly to the forming board*.
COUCH ROLL	At the end of the paper machine nearest the press*. A roller with many holes through which moisture is vacuumed out of the paper. Helps to "bed down" the fibers into a closer unit.
CONVEYOR BELT	A continuous belt of rubber material used to transport materials such as chips and sawdust.
DIGESTER	Two tubes in which screws move the chips, sawdust and liquor*. The tubes are heated to 350°F and 150 pounds of pressure is maintained within. Used to cook the chips and sawdust into wood fibers.
FORMING BOARD	An area at the start of the paper machine that helps form the pulp* into a mat* about 176 inches wide.
FRINGE BENEFIT	See Saw and Planing Mill vocabulary.
HEAD BOX	A system of dispursing pipes and rollers which feed the pulp* out onto the forming board* in a thin layer.
LIQUOR	Liquid sulfur and caustic soda used to cook or decompose the chips and sawdust into fibers.
MAT	Loosely intertwined network of fibers left behind after the pulp* has been strained through a wire or plastic screen.
PRESS	Rollers that squeeze the moisture out of the mat* as the paper passes between.
PULP	Wood fiber and water.
REEL	(1) The machine that winds the paper into rolls as it comes out of the dryers. (2) The axle-like bar around which the paper is wound.
REFINER	A machine made up of many large disk plates about 3 feet in diameter. Into the center of these comes the pulp* and as it moves between the plates, it is crushed into still smaller fibers.
REPULPER	A machine which mixes waste paper and waste white water with large propellers into paper pulp*.

*Defined in the vocabulary section

TABLE ROLLS	A series of rollers over which pass the mat* in the paper machine. These rollers perform the function of extracting more moisture from the mat as the mat rolls over them.
WHITE WATER	The water that is taken out of the paper on the paper machine. Used in the repulper*. This water is usually any of various colors.
WIRE	A continuous screen belt made of wire or plastic used to form the mat* and carry it through the paper machine.

*Defined in the vocabulary section

NOTE:

THE FOLLOWING OCCUPATION GROUPS SHOULD NOT BE IMPOSED UPON THE STUDENTS DURING THEIR PARTICIPATION IN ACTIVITY 1-D.

KEY OCCUPATION GROUPS

SAW, PLYWOOD AND PAPER MILLS

BARKER OPERATORS*

CLEAN-UP CREWS*

CLIPPERS*
Green Clipper Operator
Dry Clipper Operator

ENGINEERS*

FEEDERS*
Trimmer Feeder
Feeder-Planing Mill
Charger Operator
Green Clipper Spotter
Dryer Feeder
Core Feeder
Core Crowder

GLUERS*
Edge Glue Operator
Stripper Operator

GRADERS*
Lumber Grader
Plywood Grader

LOADERS*
Repulper Loader
Shipper-Paper Mill
Truck Dump Operator
Loader Operator
Stacker Operator
Crane Operator
Cat Operator

MACHINE TENDERS*
Back Tender
Machine Tender-Paper Machine
Refine Operator
Digester Operator
Hot Press Operator
Planer Tender
Trimmer, Edger, Sander-Machine Tender
Liquor Plant Operator
Repulper Operator

MECHANICS*

MILLWRIGHTS*

PATCHERS*
Raimann Patcher Operator
Finish Patcher

PONDMEN*

PULLERS*
Planer Chain Puller
Green Veneer Puller
Veneer Puller
Green Chain Puller

QUALITY CONTROLLERS*
Paper Tester
Lab Technician

SAWYERS*
Block Sawyer
Head Rig Sawyer
Gang Sawyer
Edgerman
Trimmerman
Hula Sawyer
Cant Cut Off Sawyer
Lathe Operator

SCALERS*

SECRETARIES*

SEPARATORS*
Head Rig Off Bearer
Separator Operator
Deck Man
Third Hand (3rd)

STRAPPER OPERATORS*
Saw, Plywood and Paper Mills
4th and 5th Hand

*Defined in the vocabulary section

On the preceding page, you will find a list of key occupation groups found within the lumber processing industry. These groups are not inflexible, but have been arbitrarily set up according to similar skills involved in each job. No attempt will be made here to give a full job description. Instead we will give an overview of the skills involved in each job.

BARKER OPERATORS	Operate the chains which bring the logs into the barker*. Whether the barker is a hydraulic or a mechanical type, the operator must position the log in the barker so that the machine can do its work.
CLEAN-UP CREWS	These jobs entail just what the name suggests. They are usually the starting position for any new man coming into the mill. This gives the worker a chance to become familiar with the machinery, how it works and skills involved in its operation.
CLIPPERS	These men activate large knife-type blades to clip defects such as knots and pitch pockets from the veneer*. These men also function as a sort of grader* determining the quality of the cut veneer when it leaves their clipper.
ENGINEERS	Are responsible for designing any major overhauls or replacement machinery that is used in the mill.
FEEDERS	These men and women are responsible for feeding the material into the machines in such a manner that it does not clog, bind, or otherwise foul the machinery. Upon their performance depends the quality of the product coming out the other side of the machine and the machine operator's ability to perform his work.
GLUERS	Are unique to the plywood mill. They are responsible for gluing small pieces of veneer* together to form the larger 48" x 96" sheets.
GRADERS	These men are responsible for placing a grade on the lumber which will help determine its use and economic value. These men must know a great deal about types and quality of lumber.
LOADERS	Although they have many titles, their main function is to operate some sort of mobile machinery such as cranes, stackers, hysters, etc., and move it to the warehouse, rough yard, or shipping point. In the case of the cat operator, the material is placed in storage and removed from storage as production requires.

*Defined in the vocabulary section

MACHINE TENDERS	Although they have many titles, these workers' main responsibilities lie in adjusting the machine so that it will continue to do the function for which it was designed. The quality of the finished product depends upon the proper performance of their duties.
MECHANICS	Responsible for servicing and maintaining the mobile equipment used at the mill site. This would include hysters, loaders, trucks, buses, etc.
MILLWRIGHTS	These men are responsible for keeping all of the mill equipment working. They may be specialists in any number of jobs from electrical, mechanical to carpentry.
PATCHERS	These men and women are responsible for repairing any defects in the veneer* to bring it up to the quality demanded by the consumer.
PONDMEN	Use pike poles* to shove the logs into slips*.
PULLERS	These men and women are responsible for removing the partially finished or finished product from the assembly line according to grade, size, or number of defects. In the case of green veneer* and veneer pullers, they act as graders* since the material they are pulling has no grade mark.
QUALITY CONTROLLERS	Although these workers are present throughout the industry, they become most obvious in the paper milling process. These men are responsible for testing the product to make sure that it meets specifications required for machine operation and customer standards.
SAWYERS	Among the most important men in the mill. Upon their skills and knowledge of the lumber depends the amount of good lumber produced. In many respects they are themselves graders* in that they determine which cuts will yield the most high quality lumber.
SCALERS	Measure the log to determine the cubic feet of lumber or weigh the log, as well as determine its species.
SECRETARIES	Duties range from receptionist to keeping records of production, from written communications to file clerk, from payroll clerk to computer key punch operator. All of the many tasks assigned the secretaries are an important part of the mill operation.

*Defined in the vocabulary section

SEPARATORS These men perform the task of mechanically separating logs, lumber or paper to be re-manufactured, to go on to the next step of the process or to be used in a waste utilization process. In effect, these men too are graders who must determine how to get the most good lumber or paper from the material they looking at.

STRAPPER OPERATOR These men place a metal strap around the load and use the machine to tighten and bind the strap.

*Defined in the vocabulary section

RESOURCE PEOPLE LISTED IN THE RESOURCE SECTION OF THIS UNIT SHOULD BE CONTACTED AT LEAST ONE WEEK IN ADVANCE OF THEIR VISIT. THEY SHOULD HAVE AVAILABLE AN OUTLINE OF THE MATERIAL YOU WISH COVERED AND A LIST OF ANY EQUIPMENT YOU WOULD LIKE THEM TO BRING. (IF ONE OF THE CHILDREN'S FATHERS COULD BE USED AS A RESOURCE PERSON, THIS MAY BE BENEFICIAL TO THAT STUDENT AND THE CLASS AS A WHOLE.)

AT THIS POINT THE TEACHER MAY WISH TO BEGIN GATHERING RESOURCES AVAILABLE FOR USE IN YOUR CLASSROOM DURING ACTIVITY 3-B. LIBRARY BOOKS ARE AVAILABLE FROM BOTH YOUR SCHOOL AND LOCAL LIBRARIES. BOTH COULD PREPARED MATERIALS (FILMSTRIPS, STUDY PRINTS, 16MM FILMS, PAMPHLETS) AND COMMERCIALLY PREPARED MATERIALS AVAILABLE TO YOU ARE LISTED IN THE RESOURCE SECTION OF THIS UNIT. THESE MATERIALS MIGHT BE ASSEMBLED AND DISPLAYED IN YOUR CLASSROOM OR IN A SPECIAL SECTION IN THE LIBRARY FOR EASY ACCESSIBILITY BY THE STUDENTS.

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Week	Monday	Tuesday	Wednesday	Thursday	Friday
1st	1-A 2-A 1-B 1-C 1-D	1-E (Test for Obj. 1)	3-A 3-B 2-C	3-A 3-B 2-C	3-C 3-D
2nd	3-D 3-E	3-D 3-E 2-C	3-D 3-E	3-F	2-B 3-G Sawmill and Planing Mill
3rd	3-H 3-I 4-A or 3-J 3-K 3-L	2-B 3-G Plywood Mill 2-C	3-H 3-I 4-A or 3-J 3-K 3-L	2-B 3-G Paper Mill 2-C	3-H 3-I 4-A or 3-J 3-K 3-L
4th	3-M (Test for Obj. 3) 2-D or 2-E	4-B 4-C 4-D	2-D or 2-E 2-F (Test for Obj. 2) 4-E (Test for Obj. 4)	4-E (On-going Test for Obj. 4) 5-A 5-B 5-C	4-E (On-going Test for Obj. 4) 5-D (Test for Obj. 5) 5-E

The numbers on the calendar refer to activities on the following pages, which parallel objectives and goals. These are <u>suggested</u> activities in a <u>suggested</u> order which the instructor is free to modify and/or improvise.

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ACTIVITIES

1-A Begin this unit by asking the children questions such as the following to help them begin thinking about lumber processing and the occupations involved:

Do any of you have a father or mother working in a sawmill? A plywood mill? A paper mill?
What is his (or her) job?
What other types of work are done at this mill?

If few children have parents who work in mills, use questions such as those in the ALTERNATE ACTIVITY.

ALTERNATE ACTIVITY: Begin this unit by asking the children questions such as the following to help them begin thinking about lumber processing and the occupations involved:

How many of you have been to a sawmill?
Would you tell the class what you saw there?
What were the workers doing in this mill?
(If similar jobs are mentioned such as saw operators cutting logs and plywood, ask the following question.)
Is this job like another job mentioned earlier?

1-B Suggest that the class view the sound filmstrip entitled, WORKERS IN THE SAW, PAPER AND PLYWOOD MILLS, to learn more about the jobs of the lumber processor. Instruct the children to take notes on the presentation listing as many job titles as they can and a brief job description. (A list of the job titles may be found on pages 15-17 in the Vocabulary Section of this unit.)

ALTERNATE ACTIVITY: Suggest that the class view the sound filmstrip entitled, WORKERS IN THE SAW, PAPER AND PLYWOOD MILLS, to learn more about the jobs of the lumber processor. Divide the class into three groups: one for the sawmill, one for the paper mill and one for the plywood mill. Instruct each group to take notes during the presentation listing each job title and a short job description.

1-C Show the sound filmstrip entitled, WORKERS IN THE SAW, PAPER AND PLYWOOD MILLS.

1-D SOUND FILMSTRIP FOLLOW-UP: Listing, grouping and categorizing.
Listing: Ask for volunteers from the class to give each occupation title and a brief description of that job. List these on the chalkboard.
Grouping: Suggest to the class that some of the jobs sound like they are almost alike or use some of the same skills. Ask for volunteers to tell which jobs they think are alike and might go together. As the children make their suggestions, ask them to give reasons for their decisions. (Note: Avoid the use of the term "group" until the children use it. If some students disagree with other decisions about what jobs go together, allow those involved to discuss their ideas using their

notes. If agreement cannot be reached, the job can be entered in more than one place. As jobs are discussed, remove them from the list and group them on another section of the chalkboard)
Categorizing: When all job titles have been placed into groups, suggest to the class that they label each with an appropriate name. As names are volunteered, allow the children to discuss the appropriateness of each.

Transfer all job groups to a master chart or ditto for future reference. (If a chart is made, mount it on the bulletin board.)

1-E EVALUATION ACTIVITY: (Test for Goal and Objective 1)

MATERIALS NEEDED: Ditto copy of the worksheet on the following page for each student.

OBJECTIVE 1: Given a list of workers in the saw, paper and plywood mills and a list of their job descriptions, each learner will match the two lists with 80% accuracy in a time limit of ten minutes. (Pass out the worksheets and read through the directions with the students, being sure that all understand the time limit. Included below is a key for the worksheet.)

8	BARKER OPERATORS	20	MILLWRIGHTS
19	CLEAN-UP CREWS	11	PATCHERS
3	CLIPPERS	16	PONDMEN
18	ENGINEERS	4	PULLERS
13	FEEDERS	6	QUALITY CONTROLLERS
1	GLUERS	10	SAWYERS
7	GRADERS	14	SCALERS
12	LOADERS	5	SECRETARIES
2	MACHINE TENDERS	9	SEPARATORS
17	MECHANICS	15	STRAPPER OPERATORS

WORKERS IN THE SAW, PAPER, AND PLYWOOD MILLS

DIRECTIONS: Match the job titles on the left with the job descriptions on the right by putting the number of the job description in front of the correct title on the space provided.

____	BARKER OPERATORS	1. Glue small pieces of veneer together to form larger sheets.
____	CLEAN-UP CREWS	2. Adjust machinery so it will operate at its best.
____	CLIPPERS	3. Operate large blades which remove defects from veneer.
____	ENGINEERS	4. Remove partially finished or finished products from the assembly line.
____	FEEDERS	5. Do such jobs as receptionist, file clerk, bookkeeper, payroll clerk, etc.
____	GLUERS	6. Test the finished product, especially paper, to make sure it meets required standards.
____	GRADERS	7. Help to decide how lumber will be used and what its price will be.
____	LOADERS	8. Operate the machine which removes the bark from the logs.
____	MACHINE TENDERS	9. Separate logs, lumber or paper to go to the next step of the process.
____	MECHANICS	10. Determine which cuts will give the most high quality lumber.
____	MILLWRIGHTS	11. Repair any defects in veneer.
____	PATCHERS	12. Operate cranes, stackers, hysters, etc.
____	PONDMEN	13. Men or women who put material into machines so it does not clog or bind the machinery.
____	PULLERS	14. Determine the cubic feet or weight of the log, and its species.
____	QUALITY CONTROLLERS	15. Place metal straps around the log.
____	SAWYERS	16. Use pike poles to shove logs into slips.
____	SCALERS	17. Responsible for repairing and servicing hysters, loaders, trucks, buses, etc.
____	SECRETARIES	18. Responsible for figuring out how to make repairs on machinery.
____	SEPARATORS	19. Usually the starting position for any new man coming into the mill.
____	STRAPPER OPERATORS	20. Specialists in making repairs on all mill equipment.

ACTIVITIES

2-A Hand out a vocabulary list of the words in this unit to the class. Tell the children that they are to define the words as they do their research or from the oral reports. (Note: Since some vocabulary words do not appear in more than one process, the children will have to define these words from the oral reports given by their classmates.) Following Activity 2-F is a list of all vocabulary words in this unit from which thermal masters or transparencies can be made.

2-B Before each group makes its oral report, use one of the methods listed below so that the whole class will have the vocabulary words and definitions easily available:

Have the children in the group list the words they will be defining on the chalkboard. As the words are defined during the report, their definitions can be written on the board.

Have the children write the vocabulary words and their definitions on the chalkboard or overhead projector. Have the children make a ditto master of their assigned words and definitions in advance of their report so that the secretary or teacher may duplicate enough copies for the class.

Have the children illustrate each word, placing the word and its definition in a caption.

Depending upon the method used, allow time for the class to copy the definitions onto the vocabulary lists given to them in Activity 2-A. (Note: The teacher may wish to make a master list which may be kept for easy reference by the class. The children might enjoy making 5" x 8" vocabulary cards which could be incorporated into the bulletin board from Activity 1-D. Attach yarn or string to the card and to the appropriate occupation on the chart in which that word is used.)

NOTE: This activity correlates with Activity 3-G.

2-C ENRICHMENT ACTIVITY: Some of the children may enjoy making and using vocabulary flash cards. Supply the class with ample 5" x 8" cards. Instruct the children to write the word on one side of the card and the definition on the other. The students may work in twos or small groups taking turns showing each other the words and asking for the definitions or vice versa.

2-D ENRICHMENT ACTIVITY: GAME: WORD POWER

Teacher Preparation---None

Objectives----------The object of this game is to see who, during the period of the game, can remain standing the longest.

Procedures----------One student stands next to the desk of another student. The teacher gives a vocabulary definition

Procedures (cont'd.)---aloud. The first student to answer the question correctly gets to move on to stand by another person and attempt to answer another question. If the person who is standing does not answer the question correctly, he takes the seat of the person he is standing next to. If neither can give the correct term, the definition is kept and re-used by the teacher at a later time.

Rules----------In case of a tie, the teacher must give another definition. When a definition fits more than one word or job, the first correct answer is accepted.

2-E ENRICHMENT ACTIVITY: GAME: COLLEGE BOWL

Teacher Preparation----Make two different colored sets of all vocabulary words to be defined on 5" x 8" cards, one word to a card.

Procedure----------Divide the class into two teams. Hand out the word cards, one color for each team, one card at a time to each student until all cards are gone. Give a definition orally to the class. If the student has the card with the correct term on it, he may answer the question. If he thinks he has the right word he may also try.

Rules----------To be able to answer, the student with the card must stand up and say "CALL!" In this way the teacher sees and/or hears the first person to stand on each team. If the answer given by the first person to stand AND say "CALL" is correct, his team gets the point. If he missed the question, the first person who "called" on the other team gets a chance to answer. If he is correct, his team gets a point. If both players give incorrect answers, the definition is given again later on in the game.

2-F EVALUATION ACTIVITY: (Test for Goal and Objective 2)

MATERIALS NEEDED: Thermal ditto copies of transparencies of the vocabulary words on the following pages.

OBJECTIVE 2: Given the vocabulary words as listed in this unit and a time limit of twenty minutes, each learner will select and write definitions for at least ten words without the aid of references. The teacher will determine the accuracy of the definitions given by each learner.

(Give the students copies of the vocabulary words, list them on the board or on transparencies. Be sure the students understand the directions and that they will have twenty minutes to complete the assignment.)

SAW AND PLANING MILL VOCABULARY

BARKER

BLOCK SAW

BULL CHAIN

CANT

CONVEYOR BELT

CORK BOOTS

EDGER

FRINGE BENEFIT

GANG SAW

GREEN CHAIN

HARD HAT

HEAD RIG

KILN

PIKE POLE

PLANER

PLANER CHAIN

PLANK

SEPARATOR

SLAB

SLASHER

SLIP

TIMBER

TRIMMER

PLYWOOD MILL VOCABULARY

BACK

BLOCK

CENTER

CHUCK

CONVEYOR BELT

CORE VENEER

EDGE GLUER

FACE

FEED CHAIN

FRINGE BENEFIT

HEARTWOOD

HOT PRESS

LATHE

LATHE CHARGER

LAYUP MACHINE

PLYWOOD

RAIMANN PATCHER

SAPWOOD

SLIP

SPLICER

TRAYS

VENEER

PAPER MILL VOCABULARY

BREAST ROLL

COUCH ROLL

CONVEYOR BELT

DIGESTER

FORMING BOARD

FRINGE BENEFIT

HEAD BOX

LIQUOR

MAT

PRESS

PULP

REEL

REFINER

REPULPER

TABLE ROLLS

WHITE WATER

WIRE

KEY OCCUPATIONS IN SAW, PLYWOOD AND PAPER MILLS

BARKER OPERATORS

CLEAN-UP CREWS

CLIPPERS

ENGINEERS

FEEDERS

GLUERS

GRADERS

LOADERS

MACHINE TENDERS

MECHANICS

MILLWRIGHTS

PATCHERS

PONDMEN

PULLERS

QUALITY CONTROLLERS

SAWYERS

SCALERS

SECRETARIES

SEPARATORS

STRAPPER OPERATORS

3-A Discuss with the class the fact that although they do know that many people are employed doing different jobs in lumber processing, they still lack information about the process itself. Suggest to the class that research on this subject might help them more clearly understand how the saw, plywood and paper mills operate. Place the three types of mills to be studied on the chalkboard or overhead projector. Either assign children to do research on the process used in each, or let them volunteer to research the one in which they are most interested.

ALTERNATE ACTIVITY: Discuss with the class the fact that although they do know that many people are employed doing different jobs in lumber processing, they still lack information about the process itself. In a class discussion, let the children propose how they would go about studying the three main lumber processing methods used in Coos County. Keep in mind, however, the objective that you are trying to meet (as listed in the OBJECTIVE section of this unit).

3-B ENRICHMENT ACTIVITY: Lead the class in a discussion of research technique by using questions such as the following:

Where might we find information about these processes?
Are there other places we might look for information?
Where could you look in this resource to see if it contained information which would be useful to you? (index, table of contents)
Is it important to use more than one resource book (magazine, encyclopedia, etc.) when doing research? Why?
How many resources should we use?
Would it be helpful to talk to someone who works in one of these mills? Why?

Allow the children to begin their research. Make sure that the children understand the time limit for research and the date set for a progress report where problems will be discussed (Activity 3-C). (Note: Some of the children might ask if they may use the COULD prepared sound filmstrip from Activity 1-B. If so, allow their use only without the audio portion. Other resources listed in this unit should be made available to the group for research and possible use during presentation to the class of their reports.)

3-C Let the students discuss what they have done in their groups so far. Note any requests for materials and equipment and arrange for their availability accordingly. As the children discuss problems they are encountering, ask questions such as the following to help them conclude that more information may still be needed:

(Referring to an appropriate job title in the chart or ditto from Activity 1-D...) Where does this man's job occur in the process?
What does he do?
How much is he paid?
Do you think he will want to work in the same job for the rest of his working life? Why or why not?
If he does get promoted, what job will he be assigned?

Suggest to the class that a resource person might be of some help in doing further job research. Instruct the children to discuss, in their groups, what information they might want to obtain about jobs involved in the process from a resource person.

Accept volunteers, or assign a recorder for each group. Have a discussion. Lead the children to include wages, equipment, working conditions, etc. Have each group present their questions to the class. List these on the chalkboard or overhead projector. Have the children copy the final drafts from the board.

3-D Tell the children you have a list of people who could talk to them about the jobs involved in each of these processes. Either arrange for these visitations yourself, or use the following procedure for having the children in that group arrange for the visits: (See RESOURCE section of this unit for resource people and suggested resource outlines.)

> If you were to call this person, what things would he want to know about his visit? (Time, school, name, grade, teacher)
> List their ideas on the chalkboard or overhead projector.
> Would it be helpful to tell him or her something about what we are studying? In what way?
> Would you like to also invite this person to have lunch with the class? (Before or after the interview?)
> Accept volunteers for or assign students to call the resource people.

Allow several visitation dates and times from which they may select. (Note: This procedure may involve a group of children interviewing while the rest of the class is involved in research or classwork if all resource people do not come the same day. Arrange for a place where the children may interview their visitor without being interrupted.)

Another good idea would be to contact the local news media to inform them of the resource person's visit and, if applicable, demonstration time, date and location. Many times they will send a photographer to record the visit for the general public. Don't forget any local TV stations in the area and do not be afraid to call! These people are always happy to obtain newsworthy articles and pictures. Be sure to clear this with your resource speakers as they may be bothered by photographers and newsmen.

3-E Instruct the children to compile all their notes and begin writing their reports.

3-F Instruct the children, in their groups, to plan their presentations to the class. Each student should present part of the process and the jobs involved as well as the vocabulary and definitions necessary. If the children have made a flow chart showing the process involved, encourage them to refer to this during their presentations.

3-G Have each group make their presentation to the class beginning with the sawmill and then going on to Activity 3-H. Repeat this procedure for the plywood and paper mills.

NOTE: This activity correlates with Activity 2-B.

3-H ENRICHMENT ACTIVITY: Arrange for a field trip to the mill reported upon in Activity 3-G. Before or after the tour, the children might like to have their guide discuss some of the following information:

Discuss the vocabulary. (This can be done by providing the guide with the list from Activity 2-A.)
Is this process the same one as all (saw, plywood, and paper) mills use? Why or why not?
How many workers do you employ here?
What job would I have to start on if I came to work at this mill?
Discussion of some of the ECOLOGICAL problems being worked on by the industry.
(Note: The last question is of importance and the information gathered here correlates with Activity 4-A.)

While making plans for the field trip, encourage the children to bring their camera along on the field trip and take pictures for personal use and use by the class. If the teacher wishes, his camera or one owned by the school can be used to record the field trip and the slides edited with an audio tape script for use by classes in years to come. Also, if the school, children, or teacher has a tape recorder, a student may be taught its proper use and operation and be allowed to tape the guide on the field trip. Another good idea would be to contact the local news media and inform them of your planned trip, the date, and the time. Many times they will send a photographer to record the trip for the general public. Don't forget any local TV stations in the area and don't be afraid to call! These people are always happy to obtain newsworthy articles and pictures.

3-I FOLLOW-UP: In a class discussion, review the process observed and where the jobs and vocabulary studied enter the process. Ask the children questions such as the following about the jobs seen at the mill:

Do you think you might like to work in this mill? Why or why not?
What job would you like to do? Why?
What job did you like the least? Why?

3-J Tell the class that they are going to view a presentation that will help them review what they have learned. Instruct them to be aware of the process, jobs, and vocabulary used. Listed in the RESOURCE section are media which can be used to review all three milling processes. Your selection should be based upon class need and whether or not the media was used during Activities 3-B or 3-F.

3-K View the selected media.

3-L FOLLOW UP: In a class discussion, review the process observed and where the jobs and vocabulary studied enter the process. Ask the children questions such as the following about the jobs seen at the mill:

Do you think you might like to work in this mill? Why or why not?
What job would you like to do? Why?
What job did you like the least? Why?

3-M EVALUATION ACTIVITY:

MATERIALS NEEDED: Thermal ditto copies of the worksheet for the entire class.

OBJECTIVE 3: Given the random list of job titles, vocabulary words, and ten minutes, each learner will group the job titles and vocabulary words with 80% accuracy under the appropriate headings: (Pass out the worksheets and read through the directions with the students. Be sure they understand the time limitations. A key is provided below for the worksheet.)

SAWMILL	PLYWOOD MILL	PAPER MILL
block saw	lathe operator	couch roll
bull chain	patchers	pulp
conveyor belt	veneer	white water
gang saw	pullers	liquor plant operator
head rig	hot press	conveyor belt
slip	core feeder	secretary
secretary	conveyor belt	
	slip	
	secretary	
	block saw	

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SAWMILL, PLYWOOD MILL OR PAPER MILL?

DIRECTIONS: Place each word in the list below under the proper heading, SAWMILL, PLYWOOD MILL or PAPER MILL. Be careful, some words may belong under more than one heading!

hot press, slip, head rig, white water, veneer, lathe operator, conveyor belt, gang saw, pulp, bull chain, secretary, patchers, block saw, liquor plant operator, couch roll, pullers, core feeder

SAWMILL	PLYWOOD MILL	PAPER MILL

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ACTIVITIES

4-A ENRICHMENT ACTIVITY: Discuss with the children the ecological problems presented by the guide on the field trip. List these on the chalkboard or overhead projector as they are discussed and save them for future reference (in Activity 4-D). Repeat this procedure for each mill visited.

NOTE: This activity correlates with Activity 3-H.

4-B Introduce the COULD prepared 16MM Sound Film entitled, THE ENVIRONMENT; IT HELPS US. CAN WE HELP IT? by asking questions such as the following:

What does the word ecology mean? (Allow the children to look the definition up in a dictionary, if necessary.)
What does the word environment mean? (Allow the children to look the definition up in a dictionary, if necessary.)
Does the environment or ecology of Coos County help the lumber processing industry in any way?
Does the lumber processing industry do anything to harm the environment or ecology?

Instruct the class to view the film listing the answers to the following questions:

How does the environment or ecology of our county help the lumber processing industry?
How does the lumber processing industry affect the environment and the ecology of the county?

4-C View the COULD prepared 16MM Sound Film entitled, THE ENVIRONMENT; IT HELPS US. CAN WE HELP IT?

4-D FOLLOW-UP: In a class discussion, list the answers to the questions in Activity 4-B. (Add this information to the chart from Activity 1-D if used.)

4-E EVALUATION ACTIVITY: (Test for Goal and Objective 4)

MATERIALS NEEDED: The list from Activity 4-D, an assortment of drawing media on which to represent the students' solutions.

OBJECTIVE 4: Given a choice of the environmental and ecological problems facing the lumber processing industry in Coos County listed in Activity 4-D, each learner will:

a. Select one problem
b. Invent a solution
c. Represent the solution in a visual diagram
d. Explain the diagram in a two-to-four minute presentation to the class

The overall time limit will be set by the teacher. It is recommended that this activity be spread over a period of three (3) days.

(Directions such as the following could be given: If you were an inventor and could invent anything you could think of, what things would you invent to solve one of these problems? (Refer to list from Activity 4-D) When you decide upon an invention, make a drawing or picture of it in any way you choose. Then try to explain your problem and invention in about three (3) minutes using your drawing. (A tape recorder may be used for their explanations.)

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ACTIVITIES

5-A Lead the children in a class discussion of the following question, listing their ideas on the chalkboard or the overhead projector:

> Why do people work?

Help the children to conclude that people work to earn money to buy necessities (food, clothing and shelter) as well as those things they could do without (luxuries).

5-B Ask for a volunteer to look up fringe benefit in the dictionary. Some of your students may have an idea already what fringe benefits are. Discuss the definition and the students' ideas and list on the chalkboard or overhead projector some possible fringe benefits for workers in lumber processing (health insurance, pension, vacation, sick leave, jury duty, etc.).

5-C Read the following situations to the class or write them on the chalkboard or overhead projector. Allow the class to think about and discuss the two situations, then ask them which one they think would be preferable to them if it were to actually happen.

> IF I gave each of you $10.00 a week for coming to school, but charged you $2.00 an hour for free time; and the principal taxed you 25¢ for each dollar I paid you every week.
>
> IF I gave each of you $8.00 a week for coming to school and also gave a fringe benefit of one hour of free time each week; and the principal taxed you 25¢ for each dollar I paid you every week.

You may have to help your students calculate which may be the favorable situation. It may be helpful to role play each situation with students being the teacher, the principal and a student. Play money could be made on strips of paper.

As the students discuss the two situations, try to bring in the following considerations:

> Fringe benefits are not taxed, therefore increased fringe benefits usually result in less tax being paid on the gross income (which includes the value of the fringe benefits) and results in a higher net income. If the fringe benefits are not used or wanted (if a student did not take the free time benefit) the worker may be better off receiving the pay ($10.00) and paying the taxes on it.
>
> A controversy lies in the area of who decides what the fringe benefits will be, if any--the employer (teacher) or the employee (student). The employee may not feel that the fringe benefit offered by the employer is worth a cut in pay.

5-D EVALUATION ACTIVITY: (Test for Goal and Objective 5)

MATERIALS NEEDED: Thermal master ditto copy of the worksheet on the following two pages for each student.

OBJECTIVE 5: Given the worksheet entitled, THE WORKER AND HIS WAGES listing the highest and lowest paid workers in the mill, each learner will, with 80% accuracy, calculate the following average pay and wages and answer the remaining thought questions within a time limit set by the teacher:

a. Average hourly pay for a mill worker
b. Wages for an 8 hour work day
c. Wages for a 40 hour work week
d. Wages for a 4 week month
e. Wages for a 52 week year
f. Average total wages paid to all mill workers in Coos County

(The following may be used to introduce the activity: Ask the class if they have any idea what an average mill worker earns in a year. Tell the children that today they are going to do some simple math which is important to all mill workers; they are going to figure out how much an average mill worker makes in wages. If the children are not familiar with how to find an average, the first question may be done for the class on the chalkboard or overhead projector and have them enter the answer in the space provided after the worksheet is passed out. Be sure the students understand the directions and how much time they will be allowed.)

Below is the key for the worksheet entitled, THE WORKER AND HIS WAGES.

1. $4.75 an hour
2. $38.00 a day
3. $190.00 a week
4. 4 weeks; $760.00 a month
5. $9880.00 a year
6. $14,820,000. a year total
7. (Answers will vary)
8. Allows storekeepers and merchants to buy things they need (allow any justifiable answer)
9. Move to another area, find another job. (allow any justifiable answer)
10. Other people would have less money because the mill workers would not buy as much, other businesses may have to close. (allow any justifiable answer)

5-E Review the worksheet in a class discussion. Allow the children to show on the chalkboard or overhead projector how they arrived at their answers. Lead the children to conclude that the buying power provided by wages paid workers in the lumber processing industry help provide jobs and wages for others not directly involved in that industry. (Questions 7 - 10)

THE WORKER AND HIS WAGES

THE MONEY PEOPLE EARN IS ONE REASON THEY WORK. PRETEND THAT YOU ARE AN AVERAGE MILL WORKER IN THE LUMBER PROCESSING INDUSTRY IN COOS COUNTY. FILL IN THE ANSWERS TO THE QUESTIONS BELOW TO HELP YOU LEARN HOW MUCH MONEY YOU WILL BE MAKING IN YOUR JOB. SHOW ALL YOUR WORK IN THE SPACE PROVIDED.

1. The highest paid worker in the mill gets about $6.00 an hour. The lowest paid worker gets about $3.50 an hour. Since you are an AVERAGE paid worker, find the average pay. $_____ an hour

2. Using your answer from question number one, figure out how much money you would earn in one 8 hour day and enter your answer in this space. $_____ a day

3. If you work 40 hours a week, how much money would you earn each week? $_____ a week

4. How many weeks are there in a month? _____ How much money would you earn in a month? $_____ a month

5. If we think of a year as 52 weeks, how much money will you earn in a year? $_____ a year total

6. There are about 1500 people working in the lumber processing industry in Coos County alone. What amount of money do they all get paid in one year? $_____ a year total

7. What things will you spend your earnings to buy? List as many as you can think of in the space below. (HINT: what things do your parents buy with the money they earn?)

8. How does the money you spend to buy things help others?

8. How does the money you spend to buy things help others?

9. What do you think the mill workers would do if they suddenly lost their jobs?

10. How would the mill workers losing their jobs affect other people in the county?

COULD PREPARED MATERIALS

	Activity No.
16MM SOUND FILM	
The Environment; It Helps Us. Can We Help It?	4-C
SOUND FILMSTRIP	
Workers in the Saw, Paper and Plywood Mills	1-C, 3-B,D,E,F,G,K
PRINTED MATERIALS	
PAMPHLETS	
The Saw and Planing Mills	3-B,D,E,F,G,K
The Plywood Mill	3-B,D,E,F,G,K
The Paper Mill	3-B,D,E,F,G,K

RESOURCES

COMMERCIALLY PREPARED MATERIALS

		Activity No.
16MM SOUND FILMS		
Your Career in the Paper Industry		3-B,D,E,F,G,K
Paper and Pulp Making		3-B,D,E,F,G,K
Paper		3-B,D,E,F,G,K
FILMSTRIPS		
Hardwood Processing	IED No. 270	3-B,D,E,F,G,K
The Story of West Coast Lumber	IED	3-B,D,E,F,G,K
The Lumber Mill		3-B,D,E,F,G,K
The Planing Mill		3-B,D,E,F,G,K
Plywood Industry		3-B,D,E,F,G,K
Paper Mill		3-B,D,E,F,G,K
PRINTED MATERIALS		
CHARTS		
The Lumber Contents of a Douglas Fir		3-B,D,E,F,G,K
Flow Chart of Menasha Paper Corp.		3-B,D,E,F,G,K
PAMPHLETS		
The Story of Pulp and Paper		3-B,D,E,F,G,K
Making Paper From Trees		3-B,D,E,F,G,K
The Story of Lumber		3-B,D,E,F,G,K

RESOURCE SPEAKERS

The following people have consented to act as resource people. They should be contacted at least one week in advance of their visit to give them time to prepare for their presentation and gather materials needed.*

Name	Occupation	Employer	Phone No.
David Sant	Public Relations	Weyerhaeuser	756-5121
John Mingus	Public Relations	Georgia Pacific	269-1171
Ken Lewis	Controller	Al Pierce Co.	267-4113
Ivan Hovis	Public Relations	Menasha Corp.	756-5171

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*Some parents of children in your classroom may be able to serve you as resource speakers. If this is the case, they should be contacted.

RESOURCE OUTLINE: SAWMILL PROCESS

DATE OF VISIT: _____

TIME OF VISIT: _____

SCHOOL AND ADDRESS: _____

SCHOOL PHONE: _____

TEACHER: _____

TEACHER'S HOME PHONE: _____

A. If at all possible, the resource person should bring visual aids such as pictures, small samples of various cuts of lumber, any equipment where size is not prohibitive or any safety equipment thought to be of interest to the children.

B. Points to discuss

1. What job do most workers in the sawmill begin with?
2. How much education is needed for the beginning job?
3. What is the starting pay in the sawmill?
4. What are the working conditions in the sawmill?
5. What is your job in the sawmill?
6. What do you like most about your job?
7. What do you like least about your job?
8. Does the operation of the sawmill depend in any way upon the weather or the environment?
9. Does the operation of the sawmill affect the environment?

C. Vocabulary to cover with the children

1. Barker
2. Block saw
3. Bull chain
4. Cant
5. Conveyor belt
6. Cork boots
7. Edger
8. Fringe benefits
9. Gang saw
10. Green chain
11. Hard hat
12. Head rig
13. Kiln
14. Pike pole
15. Planer
16. Planer chain
17. Plank
18. Separator
19. Slab
20. Slasher
21. Slip
22. Timber
23. Trimmer

RESOURCE OUTLINE: PLYWOOD MILL PROCESS

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DATE OF VISIT: _____

TIME OF VISIT: _____

SCHOOL AND ADDRESS: _____

SCHOOL PHONE: _____

TEACHER: _____

TEACHER'S HOME PHONE: _____

A. If at all possible, the resource person should bring visual aids such as pictures, small samples of various types of plywood, any equipment where size is not prohibitive, or any safety equipment thought to be of interest to the children.

B. Points to discuss:

1. What job do most workers in the plywood mill begin with?
2. How much education is needed for the beginning job?
3. What is the starting pay in the plywood mill?
4. What are the working conditions in the plywood mill?
5. What is your job in the plywood mill?
6. What do you like most about your job?
7. What do you like least about your job?
8. Does the operation of the plywood mill depend in any way upon the weather or the environment?
9. Does the operation of the plywood mill affect the environment?

C. Vocabulary to cover with the children

1. Back
2. Barker
3. Block
4. Bull chain
5. Center
6. Chuck
7. Conveyor belt
8. Core veneer
9. Edge gluer
10. Face
11. Feed chain
12. Fringe benefits
13. Heartwood
14. Hot press
15. Lathe
16. Lathe charger
17. Layup machine
18. Plywood
19. Raimann patcher
20. Sapwood
21. Slip
22. Splicer
23. Trays
24. Veneer

RESOURCE OUTLINE: PAPER MILL PROCESS

DATE OF VISIT: _____

TIME OF VISIT: _____

SCHOOL AND ADDRESS: _____

SCHOOL PHONE: _____

TEACHER: _____

TEACHER'S HOME PHONE: _____

A. If at all possible, the resource person should bring visual aids such as pictures, small samples of finished paper products, any equipment where size is not prohibitive or any safety equipment thought to be of interest to the children.

B. Points to discuss

1. What job do most workers in the paper mill begin with?
2. How much education is needed for the beginning job?
3. What is the starting pay in the paper mill?
4. What are the working conditions in the paper mill?
5. What is your job in the paper mill?
6. What do you like most about your job?
7. What do you like least about your job?
8. Does the operation of the paper mill depend in any way upon the weather or the environment?
9. Does the operation of the paper mill affect the environment?

C. Vocabulary to cover with the children

1. Barker
2. Breast roll
3. Couch roll
4. Conveyor belt
5. Digester
6. Forming board
7. Fringe benefits
8. Head box
9. Liquor
10. Mat
11. Press
12. Pulp
13. Reel
14. Refiner
15. Repulper
16. Table rolls
17. White water
18. Wire

The lumber processing industry in Coos County employs over 5000 men and women. Among these people there is a good deal of discussion as to whom has the better job. Loggers would agree that the mill worker's job is safer, affected less by the weather and a much "softer" job. However, mill workers work indoors most of the time amidst a great deal of noise and machinery around which a worker must be continuously careful. Mill workers, too, have to work swing or night shifts which to some people becomes an interruption to the everyday living routine. The logger, on the other hand, works out-of-doors, amidst noisy machinery and must be constantly safety-minded. Though the logger's work is more physically demanding, which adds to the list, not many loggers or transportation workers come from the woods into the mill. The logger's hours, too, are more regular. It would appear to be a matter of choice more than anything else.

You may not have noticed it was stated that BOTH men and women work in the industry. Besides the secretarial duties, without which the industry would suffer, women are also employed in the plywood mills as veneer feeders, pullers and graders. It seems strange, at first, to see women doing these jobs in what was once, and still is to some extent, considered man's work. But their ability to do the work and their presence creates a different overall atmosphere among the workers. It would appear that earrings and a fancy hairdo have found their place in the lumber processing industry.

There are few books written about the lumber processing industry today. Automation has made books written as late as five years ago obsolete. With this in mind, the list of resources below is given only if you, as the teacher, wish to become more informed about the great changes made in this industry within the past five years.

Lumber: The Stages of Manufacture From Sawmill to Consumer
by Nelson Brown and James Bethel

High Timber: The Story of American Forestry
by Charles I. Coombs

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Below are three lists that describe the processes involved in the three milling operations covered in this unit and where each job falls within that process.

SAWMILL

1. The PONDMEN shove the logs into the bull chain or log lift where they are hoisted up to the level of the mill.
2. The BARKER OPERATOR operates the chains that bring the log into the hydraulic or mechanical debarker where the bark is removed from the log. He also operates the mechanism that kicks the log out onto a chain that will carry it to the next step in the process.
3. The BLOCK SAWYER saws the log into specified lengths and can then send it to one of three places; the pond where it will be stored until used by the plywood operation, the whole log chipper, or the head rigs.
4. Standing next to the BLOCK SAWYER is the SCALER who scales the log deducting for any defects.
5. The log moves by chain to the HEAD RIG SAWYER. He operates the mechanical device that loads the log onto the carriage and fastens it in place. He moves the carriage into the saw so that it cuts off the first cut called the slab and successive cuts called planks.
6. The HEAD RIG OFF BEARER sends the slabs to the automatic slab slasher and planks to the edgers. The larger cants are sent to the cant cut-off saw and then to the GANG SAWYER.
7. The GANG SAWYER operates the gang saw which cuts the cant into planks of various thicknesses and the length of that cant from here are sent to the edger.
8. The EDGERMAN cuts the planks to specified widths and sends the boards along a conveyor chain to the next step process.
9. The SEPARATOR OPERATOR separates the edgings or waste board from the good board and sends them to the chipper to be made into chips. The good boards are either sent to the edger to be edged again, or sent to the trimmer.
10. The TRIMMERMAN operates the battery of saws that cuts the boards to specified lengths and sends them on to the next step in the process.
11. The TRIMMER FEEDER feeds the boards properly into the trim saw keeping the feed chains from being clogged.
12. The SEPARATOR OPERATOR checks the boards and sends any that need to be retrimmed or edged back to that saw. He sends any waste wood to the chipper.
13. From here the boards go to the green chain where they are graded by the GRADERS and pulled according to grade and size by the PULLERS and placed into bunks.
14. When the bunks are full, the CRANE OPERATOR lifts them and places them in the green chain well where they will be picked up by the STACKER OPERATOR and stacked in the rough yard.
15. When an order is received for planed lumber, the STACKER OPERATOR takes the lumber to the planing mill.
16. CRANE OPERATOR lifts lumber brought in by the stacker operator and places a load on rollers which lead to the FEEDER.

17. FEEDER breaks down the stack by using hydraulic hoists to tilt the load and takes boards off one at a time laying them out flat on the chain that feeds the DOUBLE EDGE TRIMMER. Raises and tilts the load as he removes the top board so that he doesn't have to bend.
18. DOUBLE EDGE TRIMMER automatically trims the ends off each piece at a preset length. Then out by chain to the belt that carries it to the PLANER.
19. PLANER automatically planes the board to a preset thickness and width. Can plane the board on two or four sides. Then it goes by chain to the grading chain.
20. GRADERS grade the lumber as it passes placing it a certain distance from the edge of the chain. These boards cut off a light beam which brings down a stamp placing the grade on the board automatically. If there are defects, the board is pulled all the way to the edge of the chain and it automatically feeds onto the chain that takes it to the HULA SAWYER.
21. HULA SAWYER looks for the marked defects in the board and adjusts the board on the cutting table against stops that measure the board. Then he activates the saws which trim off the bad part of the board, or if the board is too badly defected, cuts it up and drops the pieces onto the belt that goes to the chipper. After the board has been trimmed, he will place it on the belt and it will go back to the grading chain.
22. From the grading chain, the board goes to the PLANER CHAIN where it is pulled according to grade, width and length and placed in BUNKS.
23. When these bunks are filled, the CRANE OPERATOR lifts the load and carries it to the STRAPPER OPERATOR who places wire straps around the load and uses the machine to tighten the straps. The load is then placed on the rollers and goes out to the yard, where the ends are waxed and the load is stenciled with the company name and stacked till shipment.

MAINTENANCE

UTILITY CREW - these men are responsible for clearing out clogged conveyors and cleaning up around the plant. It is in this position that the starting worker would be placed. From here the men may be placed on a job in the case of absence to gain experience.
MECHANICS - these men are responsible for servicing all of the mobile machines used at the mill site. They must know about the machine and be able to trouble shoot where a machine is not working properly.
MILLWRIGHTS - these men are responsible for keeping all of the mill equipment working. They need to be specialists in any number of jobs from electrical mechanic to carpenter.
CLEAN-UP - in the planing mill, a man starts on the clean-up detail. This gives him time to become familiar with the process, the machinery and its workings.
SECRETARIAL - the secretaries' duties range from receptionist to keeping records of production; from written communications to file clerk. All of the many tasks assigned the secretaries are an important part of the mill operation.

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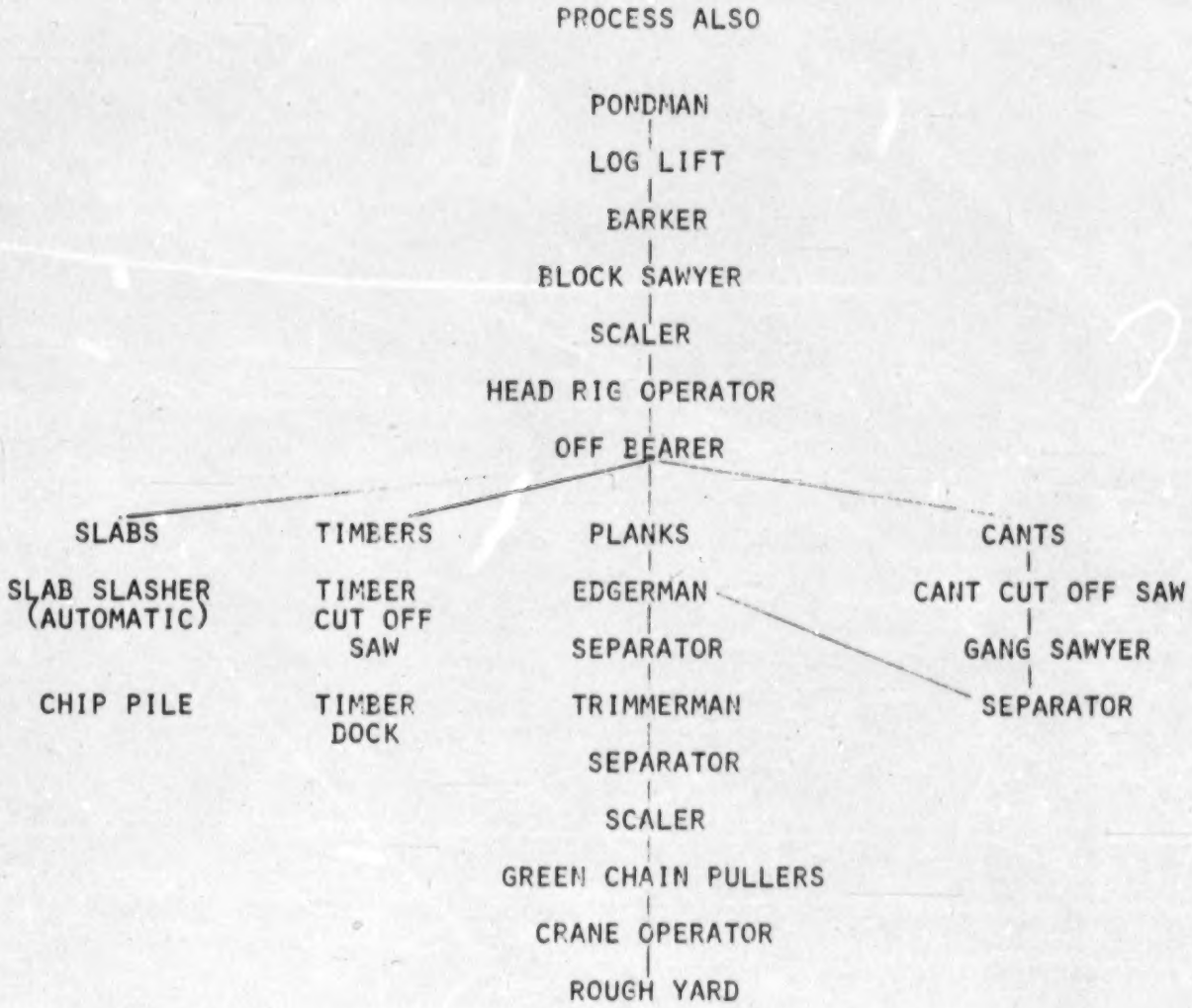
SAWMILL JOB FLOW CHART



AT EACH SEPARATOR, THE WOOD CAN EITHER

1. Pass on to the next step in the process OR
2. The wood or cutting can be sent to a slasher to make chips which are sent to the chip pile OR
3. Can be sent to special saws to be resawed and then sent back to the scalers to be re-graded.

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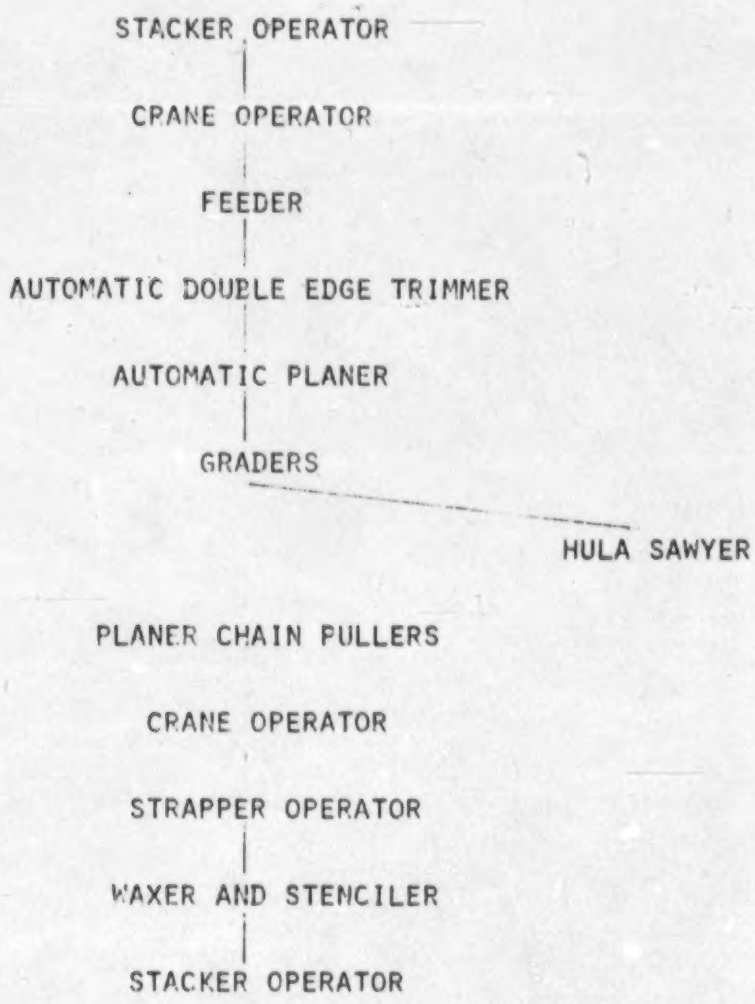
PLANER MILL JOB AND PROCESS FLOW CHART



SAWMILL AND PLANING MILL MANAGERIAL JOBS

The following is a list of managerial jobs which are salaried positions in most mills. Descriptions of these jobs are not given in detail because most involve a situation of responsibility for those working under them, whom we have already described.

WOODS PRODUCTS MANAGER

LUMBER PRODUCTIONS MANAGER

(Shipping Port)

PORT MANAGER

MATERIAL HANDLING SUPERINTENDENT

SHIPPING FOREMAN

ASSISTANT SHIPPING FOREMAN

DOCK AND WAREHOUSE FOREMAN

CARGO FOREMAN

CHIP AND TRUCK FOREMAN

RAIL FOREMAN

(Lumber Production)

LUMBER SUPERINTENDENT

HEAD GRADER

SAWMILL GENERAL FOREMAN

ASSISTANT SAWMILL GENERAL FOREMAN

FILING GENERAL FOREMAN

UTILITY GENERAL FOREMAN

PLANING MILL FOREMAN

POND FOREMAN

ROUGH YARD FOREMAN

UTILITY FOREMAN

PLYWOOD MILL

1. PONDMAN, see Sawmill process.
2. BARKER OPERATOR, see Sawmill process.
3. BLOCK SAWYER, see Sawmill process
4. PONDMEN, see Sawmill process.
5. CHARGER OPERATOR picks up the block with the charger and positions it between the chucks of the lathe.
6. LATHE OPERATOR observes the centering of the block between the chucks of the lathe and pushes the lever to push the chucks into the center of the block. Operates the lathe which peels the log into veneer and keeps the veneer flowing into the proper trays.
7. Sapwood veneer travels by conveyor belt in the trays to a GREEN CLIPPER SPOTTER who positions the veneer so that it will feed properly into the clipper where the CLIPPER OPERATOR clips out defects before the wood is fed into the dryers. If the dryers are full, a GREEN VENEER PULLER will pull the veneer to await drying.

7a. Heartwood veneer travels by trays to the dryer.

8. DRYER FEEDERS feed the veneer into the dryers.
9. The DRYER TENDER watches over the operation of the dryer which drys the veneer by use of steam heat.
10. The heartwood then passes to the DRY CLIPPER OPERATOR who clips out defects such as knots, etc., in the veneer.
11. From the DRY CLIPPER OPERATOR, the veneer goes to the VENEER PULLERS who remove the veneer from the conveyors according to grade and width and places them on carts. (The sapwood veneer goes directly from the dryers to the PULLERS since it has already been clipped.)
12. 48" wide pieces of veneer that need patching go directly to the RAIMANN PATCHER OPERATOR to be patched. 24" strips are sent to the EDGE GLUER OPERATOR who glues the pieces together into 48" wide sheets and then sends them to be patched.
13. The large 48" x 96" sheets are placed in the layup machine where they are fed into the machine as face or back. Strips are placed in the machine as core. The CORE FEEDER feeds the core pieces into the machine where they are pushed together by the CROWDER so that no space will be left between them. The machine lays the face, back, center and glues all these plus the core together.
14. The plywood is automatically (or manually) loaded into the hot press which heats the wood from 230° to 300°F and under 170 pounds of pressure. The HOT PRESS OPERATOR sees that the machine operates correctly and makes necessary adjustments. The machine unloads itself shoving the plywood into a pile, piece at a time.
15. The plywood is allowed to cool and then is fed into the machine that edges, trims and sands the pieces of plywood. A MACHINE TENDER checks machine to see that it is running properly and makes any necessary adjustments.
16. The plywood then travels by chair to the GRADER who grades the wood and either sends it to the FINISH PATCHER to have defects patched, or to the end of the chain where the pieces of wood drop into a pile.

17. The load is then strapped by the STRAPPER OPERATOR who places the strap around the lead and uses the machine to tighten and bind the strap.
18. The load is then moved into railroad cars or stored in the warehouse by the STACKER OPERATOR.

Some of the jobs in the mill do not fall at any one place in the process. These are the jobs of the maintenance men, mechanics and secretarial workers.

MAINTENANCE, see the Sawmill process.
SECRETARIAL, see the Sawmill process.

PLYWOOD MILL JOB AND PROCESS FLOW CHART

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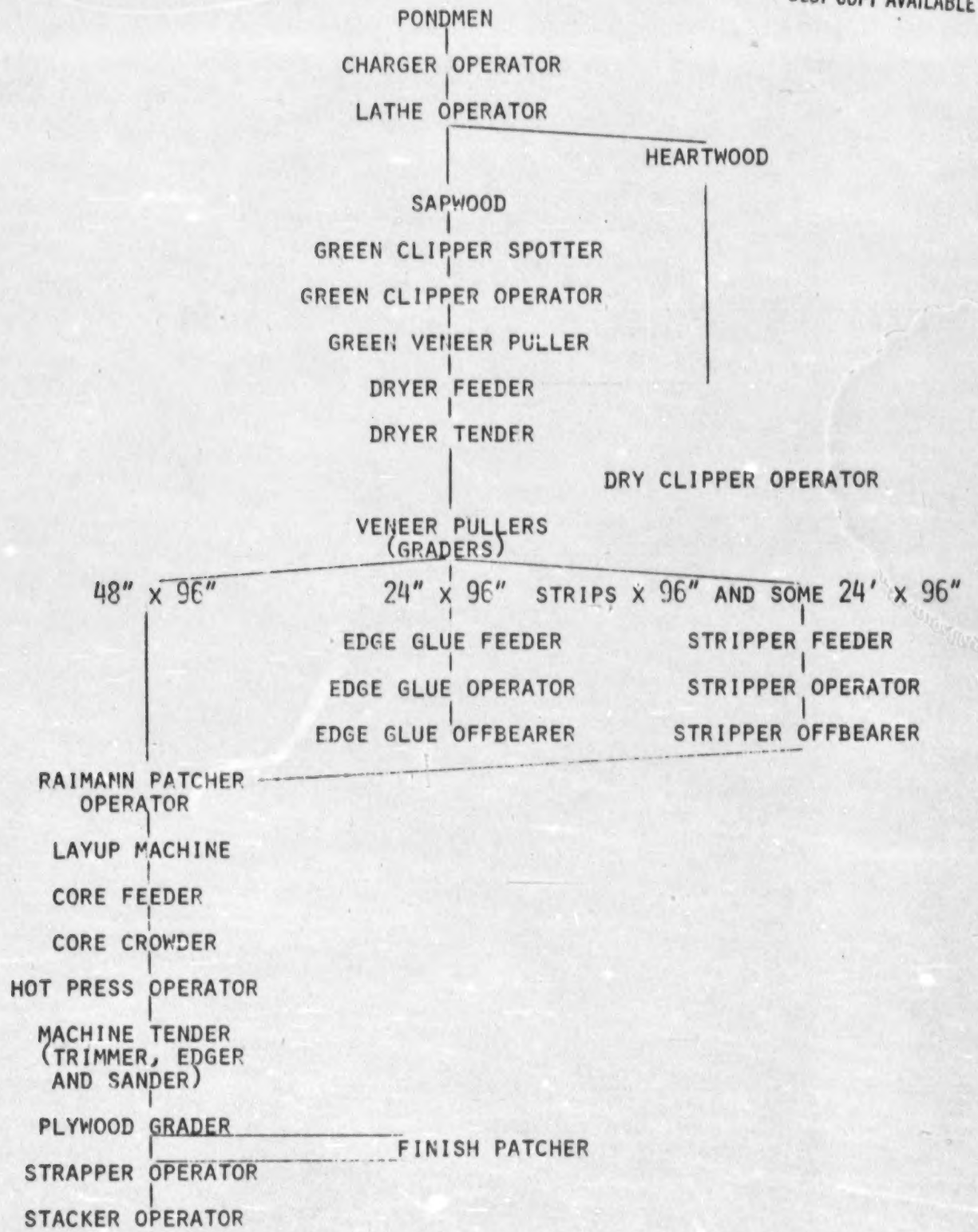

PLYWOOD MILL MANAGERIAL JOBS

The following is a list of managerial jobs which are salaried positions in most mills. Descriptions of these jobs are not given in detail because most involve a situation of responsibility for those working under them, whom we have already described.

WOODS PRODUCTS MANAGER

PLYWOOD PLANT MANAGER

PLYWOOD GENERAL FOREMAN

GREEN END GENERAL FOREMAN

DRY END GENERAL FOREMAN

FINISH AND SHIPPING GENERAL FOREMAN

VENEER PREP FOREMAN

GREEN END FOREMAN

DRY END FOREMAN

LAY-UP FOREMAN

FINISH FOREMAN

SHIPPING FOREMAN

QUALITY CONTROL TECHNICIAN

PRODUCTION CLERK

PAPER MILL

1. Scalers check the logs coming in as to whom they belong and what type they are. Also weighs the load.

1a. The TRUCK DUMP OPERATOR operates the machine that lifts the trailer or tractor and trails into the air and dumps the chips into a blower where they are blown to the chip piles. The same process is done for sawdust but it is blown to the sawdust bin. Both remain stored until transfered to the digester by conveyor belts.

2. LOADER OPERATOR unloads the logs from the truck and places them in cold decks until needed. Also loads the chain conveyor that feeds the Barker.

3. BARKER OPERATOR, see Sawmill process.

4. DECK MAN sends the log to the head rig or the whole log chipper. Cuts ends and knots off logs if necessary and keeps the chain clear.

5. HEAD RIG SAWYER cuts the large diameter logs into smaller pieces that will fit in the whole log chipper.

6. Chips come from the chipper and are fed by conveyor belt into a hopper where they are screened out in three sizes: the large chips are sent to a special chipper to be rechipped; the small chips are sent by conveyor belt to the boilers to be used as fuel; the medium sized ones are blown over to the chip piles where they will be kept until needed.

7. The CAT OPERATOR shoves the chips away from the pipe to keep the area clear. He will push the chips over a turn table which will in turn rake the chips onto a belt that will feed the chips into a washer and then up to the digester.

8. LIQUOR PLANT OPERATOR supervises the cooking of the liquor used in the digesting process.

9. DIGESTER OPERATOR controls the temperature and pressure in the digester. Also controls the chips, sawdust and liquor flow into the digester. A screw mechanism drives the chips through the chipper where they are cooked at about 350° for 26 minutes while moving through the digester. This process yields the pulp used in making paper.

10. The chips then flow into a pressafiner which squeezes the liquid out of the pulp.

11. The pulp then flows to the refiners where the REFINER OPERATOR adjusts the machine so that they will further grind the pulp into finer fibers.

12. The pulp then goes through a series of cleaners that remove sand and metal.

13. A pump forces the pulp into the head box where distribution pipes and rollers feed the pulp in a layer onto the wire of the paper machine.

14. This mat of pulp goes onto a forming board, then passes over a number of rollers which vibrate more moisture out of the pulp. Vacuum boxes remove further moisture and the final couch roll vacuums out even more as well as squeezing the mat.

15. The press rolls vacuum and press out even more moisture as the paper goes between them.

    NOTE: The processes listed in numbers 13 through 15 are under the watch of the MACHINE TENDER who makes adjustments as needed. The speed and temperature of the paper machine, press and dryer are computer controlled to some extent.

16. The paper then moves into the dryer section where the rest of the moisture is removed as it travels over the dryer's 48 steam heated rollers whose temperatures range from 265° - 330° F.

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17. The dry paper is then fed onto a reel which rolls the paper. The reel and the amount of paper wound on each is determined by the BACK TENDER who is also responsible for putting new reels on the machine.
18. The 3rd HAND removes the reels from the machine by use of an overhead winch and places them on the unwinder, then feeds the paper into the rewinder. He adjusts the blades to cut the paper to the width ordered by the customer and makes rolls of the ordered length.
19. The 4th and 5th HANDS place a paper envelope around the roll and use a small elevator to lower the roll from the rewinder to the scales where they band, weigh and stencil the roll.
20. The SHIPPER drives the forklift up to the roll and clamps it, then carries it to the warehouse or to railroad cars or trucks for delivery.

There are some jobs in the Paper Mill that do not come at any one particular point in the process. These are the jobs of quality control, maintenance, engineering and lab work.

QUALITY CONTROL

PAPER TESTER tests the paper for crush, tear and bursting points as well as weight.

Part of Menasha's paper pulp is derived from the use of waste paper in the form of cardboard boxes that have been crushed, bundled and shipped as far away as Los Angeles. This process provides some jobs in the mill.

1. The REPULPER LOADER uses a forklift to carry the bundles of waste paper from the warehouse to the repulper and places them on the feed belts.
2. The REPULPER OPERATOR adjusts the machine which mixes the waste paper and waste white water with large propellers into paper pulp.
3. The pulp is then sent to the clipping refiner which grinds the pulp further, and then into the main flow of virgin stock at step number 11 in the paper mill process.

LAB TECHNICIANS test the pulp, chips and liquor. The chips must be dried to determine the amount of moisture. The same is done for the waste paper. Tests are run on the liquor to determine chemical strength before it is pumped out as waste.

MAINTENANCE

MECHANICS service all the mobile equipment and the oilers keep the machinery in the mill lubricated.

MILLWRIGHTS are responsible for servicing and repairing any machinery in the mill. These men may be specialists in pipe fitting, electrical machinery, etc.

ENGINEERING

ENGINEERS draw up plans for any major overhaul of the mill equipment or its replacement. They plan for expansion of the mill or its redesign.

MAINTENANCE

CLEAN-UP MEN work mainly in the area under the dryer when there are breaks in the paper going through the equipment. They are also assigned to clean up around the mill where needed.

SECRETARIAL, see Sawmill process.

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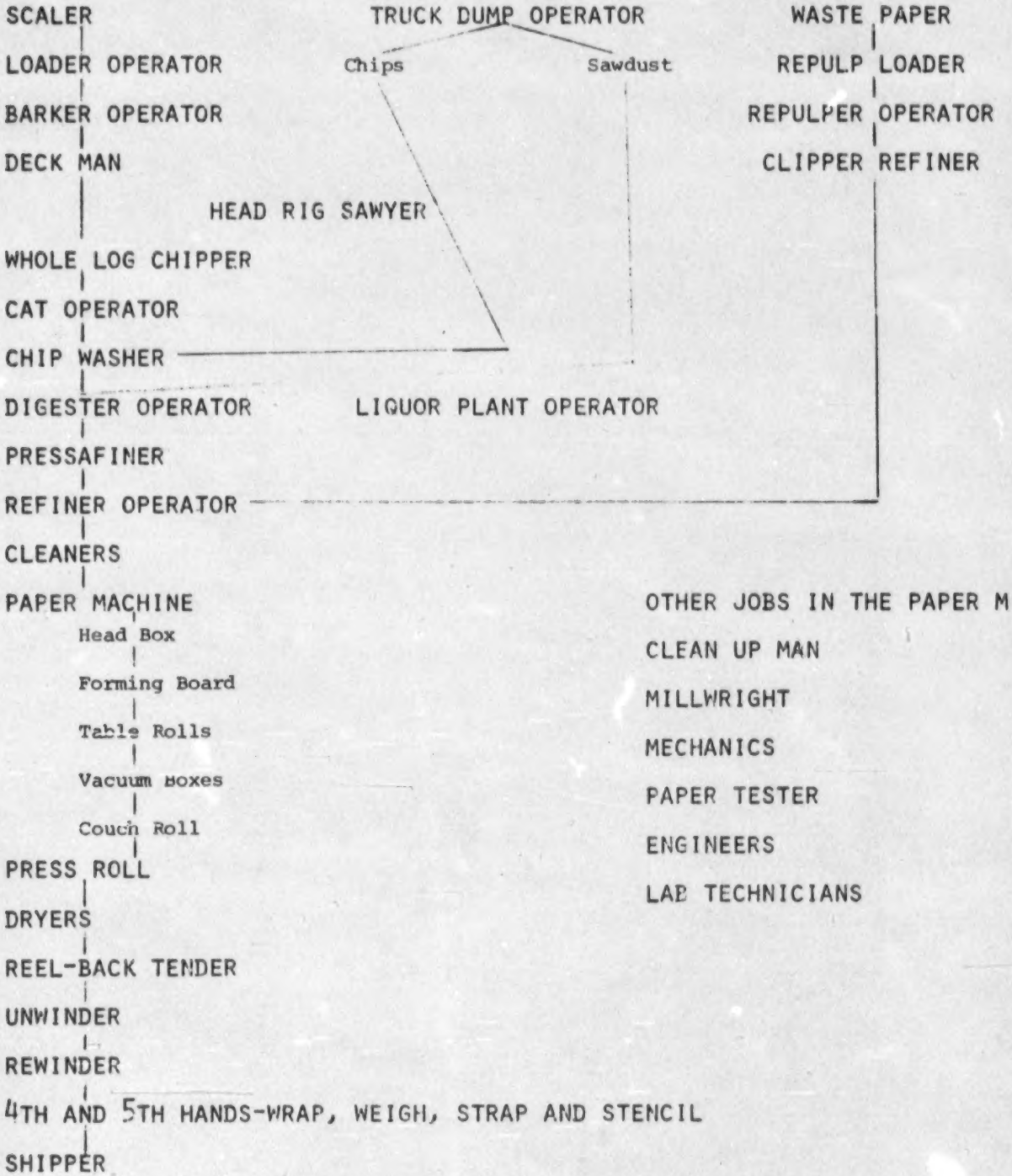
PAPER MILL JOB AND PROCESS FLOW CHART



OTHER JOBS IN THE PAPER MILL

CLEAN UP MAN

MILLWRIGHT

MECHANICS

PAPER TESTER

ENGINEERS

LAB TECHNICIANS

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PAPER MILL MANAGERIAL JOBS

The following is a list of managerial jobs which are salaried positions in most mills. Descriptions of these jobs are not given in detail because most involve a situation of responsibility for those working under them, whom we have already described.

PLANT GENERAL MANAGER

SUPERVISORS

ADMINISTRATIVE SUPERVISOR

PERSONNEL MANAGER

ADMINISTRATIVE SECRETARY

RECEPTIONIST AND CLERK

INVOICE AND BILLING CLERK

PAYROLL CLERK

UTILITIES SUPERVISOR

WOODYARD SUPERVISOR

WOOD PROCUREMENT SUPERVISOR

SHIPPING SUPERVISOR

PURCHASING AGENT

ASSISTANT PURCHASING AGENT

STOREROOM KEEPER

PLANT ENGINEER

MAINTENANCE SUPERVISOR

ASSISTANT MAINTENANCE SUPERVISOR

ELECTRICAL SUPERVISOR

STAFF ENGINEERS

PRODUCTION SUPERVISOR

ASSISTANT PRODUCTION SUPERVISOR

SHIFT FOREMAN

APPROXIMATE WAGES FOR WORKERS IN THE SAWMILL, PLYWOOD MILL, AND PAPER MILL

The following listing is based on the contract which expired on June 30, 1972. As of August 17, 1972, the IWA is awaiting the Pay Board's approval on a 32¢ per hour negotiated increase.

	Hourly Rate
BARKER OPERATOR	$ 4.07
CLEAN-UP CREWS	3.59
CLIPPERS	3.70
ENGINEERS (see MECHANICS and MILLWRIGHTS)	
FEEDERS	
Core Feeder	4.20
Planer Feeder	3.79
GLUERS	3.60
GRADERS	
Plywood	3.77
Lumber	4.43
LOADERS	3.90
MACHINE TENDERS	4.50
MECHANICS	4.84
MILLWRIGHTS	4.77
PATCHERS	3.75
PONDMEN	3.96
PULLERS	3.64
SAWYERS	6.03
Lathe Operator	4.78
SCALERS	4.70
SEPARATORS	3.79
STRAPPER OPERATORS	3.64

Fringe benefits include (1971-72 contract): 27¢ per hour for Health and Welfare; 17¢ per hour for Pension; paid holidays; 2 weeks annual paid vacation; after 5 years--one week's bonus pay per year; jury duty with pay; funeral leave with pay.